

03-3-103-AWO

INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁴ : F28D 9/00	A1	(11) International Publication Number: WO 86/05866 (43) International Publication Date: 9 October 1986 (09.10.86)
(21) International Application Number: PCT/SE86/00141 (22) International Filing Date: 26 March 1986 (26.03.86) (31) Priority Application Number: 8501599-8 (32) Priority Date: 1 April 1985 (01.04.85) (33) Priority Country: SE (71) Applicant (for all designated States except US): TORELL AB [SE/SE]; Box 1174, S-581 11 Linköping (SE). (72) Inventor; and (75) Inventor/Applicant (for US only) : HEDMAN, Erik [SE/SE]; Lövsbergsvägen 36, S-582 69 Linköping (SE). (74) Agent: WILLQUIST, Bo; PATS. Willquist Patenter, S:t Larsgatan 29, S-582 24 Linköping (SE).		(81) Designated States: AT (European patent), BE (European patent), CH (European patent), DE (European patent), FR (European patent), GB (European patent), IT (European patent), JP, LU (European patent), NL (European patent), SE (European patent), US. Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>
(54) Title: METHOD FOR ACHIEVING A FIXING OF AN IN- OR OUTLET SOCKET <div data-bbox="550 1197 1268 1650" data-label="Image"> </div>		
(57) Abstract <p>Method for executing the attachment of an inlet or outlet sleeve coupling (3, 4, 5, 6) to a supporting plate (11) of a plate heat exchanger (1). A characteristic feature of the invention is the fact that the aforementioned sleeve coupling (3, 4, 5, 6), on the side which it is intended to attach to the supporting plate (11a), is first provided with a section of thinner wall thickness than the rest of the sleeve coupling. This section is introduced into the cut-out (12) intended for the sleeve coupling arranged in the supporting plate (11a). The outer end of the aforementioned section is then formed around the edge of the cut-out (12) so as to produce a flange (14). A first fixing is achieved in this way. The sleeve coupling is then soldered in a previously disclosed fashion in conjunction with the soldering of the assembled heat exchanger (1).</p>		

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Method for achieving a fixing of an in- or outlet socket

The present invention relates to a method for executing the
5 attachment of an inlet or outlet sleeve coupling to a supporting
plate of a plate heat exchanger.

A plate heat exchanger of this kind is described in more detail in
Swedish Patent Application No. 8501599-8, from which this
10 Application is derived.

A plate heat exchanger comprises a number of preferably
rectangular plates, of which the outer plates constitute the
aforementioned supporting plates. The number of plates is selected
15 having regard for the capacity of the heat exchanger and is joined
together during manufacture, for instance by vacuum soldering. One
of the supporting plates is provided with cut-outs for inlet and
outlet sleeve couplings.

20 A problem associated with the previously disclosed design is the
complex procedure for executing the attachment of the sleeve
couplings to the supporting plate.

In accordance with the invention the procedure for executing the
25 attachment of this kind of an inlet or outlet sleeve coupling to a
supporting plate of a plate heat exchanger is simplified
considerably by the aforementioned sleeve coupling, on the side
which it is intended to attach to the supporting plate, first
being provided with a section of thinner wall thickness than the
30 rest of the sleeve coupling, by the aforementioned section being
introduced into the cut-out intended for the sleeve coupling
arranged in the supporting plate, by the outer end of the section
being formed around the edge of the cut-out so as to produce a
flange, thereby achieving a first fixing of the sleeve coupling,
35 and by the sleeve coupling then being soldered in a previously
disclosed fashion in conjunction with the soldering of the
assembled heat exchanger.

The invention is described below in further detail with reference to the accompanying drawing, in which Fig. 1 provides a diagrammatic representation of a plate heat exchanger viewed from above without a supporting plate and sleeve couplings. Fig. 2 illustrates in the form of a cross-section along the line A-A in Fig. 1 a plate heat exchanger with sleeve couplings in accordance with the invention. Fig. 3 illustrates a cross-section along the line B-B in Fig. 1 of the heat exchanger. Fig. 4 illustrates in the form of a detailed view taken from Fig. 3 an attachment of a sleeve coupling in the manner proposed in the invention.

The reference 1 is used in the drawing to designate a plate heat exchanger which comprises a number of plates 2a, 2b, 2c and 2d and inlet and outlet sleeve connections 3, 4, 5, 6. The plates 2a, 2b, 2c and 2d are essentially rectangular and have a relief pattern 7 and a border 8 running around its perimeter. This is off-set in two ledges 9, 10 by approximately one thickness of the plate so that the plates 2a, 2b, 2c and 2d are capable of being inserted into one another. This means that the border 8 can be divided up into three steps 8a, 8b, 8c. The first step, the so-called pattern step, is so arranged as to enclose the relief pattern 7 of the plate. The second step, which is referred to as the screening step, is intended to integrate the flow area for the flow channel of the subsequent plate. The third step 8c is intended to constitute a joining and sealing element with the second step of the adjacent plate and is accordingly described as the joint step.

The first ledge shall be situated at a distance from the bend in the border 8 which is approximately equal to the depth of the pattern 7 in the plate 2. The second ledge 10 shall be situated at a distance from the bend in the border 8 which is approximately equal to twice the depth of the pattern.

By specifying the position of the two ledges 9, 10 in relation to the depth of the pattern, it is possible to join together plates 2 with different depths of pattern, in so doing enabling the heat exchanger to be given particular characteristics.

In the drawing in accordance with Fig. 3 the inlet and outlet sleeve couplings are designated respectively by 3 and 6 and are attached to the supporting plate 11a by the aforementioned sleeve couplings 3, 6, on the side which it is intended to attach to the supporting plate, being provided with a section 14 of thinner wall thickness than the rest of the sleeve coupling. This section is illustrated in Fig. 4 by a solid line and is shown to be introduced into a cut-out intended for this purpose in the supporting plate. The outer end of the section with thinner wall thickness is then formed around the edge of the cut-out executed in the supporting plate so as to produce a flange 14a. A first fixing between the supporting plate and the sleeve coupling is achieved in this way.

15 The final fixing is achieved when the assembled heat exchanger 1 is soldered, with this procedure preferably being performed in a vacuum. In order to facilitate the soldering operation, and in order reliably to achieve tight soldered joints, the plates of the heat exchanger, including the supporting plates, are manufactured from a material which consists of, for example, stainless steel sheet with a thin layer of copper applied to it by rolling. The copper layer forms a solder on soldering and also produces a good soldered joint between the supporting plates and the sleeve couplings.

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Patent Claim

Method for executing the attachment of an inlet or outlet sleeve coupling (3, 4, 5, 6) to a supporting plate (11) of a plate heat exchanger (1), characterized in that the aforementioned sleeve coupling (3, 4, 5, 6), on the side which it is intended to attach to the supporting plate (11a), is first provided with a section of thinner wall thickness than the rest of the sleeve coupling, in that this section is introduced into the cut-out (12) intended for the sleeve coupling arranged in the supporting plate (11a), in that the outer end of the section is formed around the edge of the cut-out (12) so as to produce a flange (14), thereby achieving a first fixing of the sleeve coupling (3, 4, 5, 6), whereupon the sleeve coupling is soldered in a previously disclosed fashion in conjunction with the soldering of the assembled heat exchanger (1).

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FIG 1

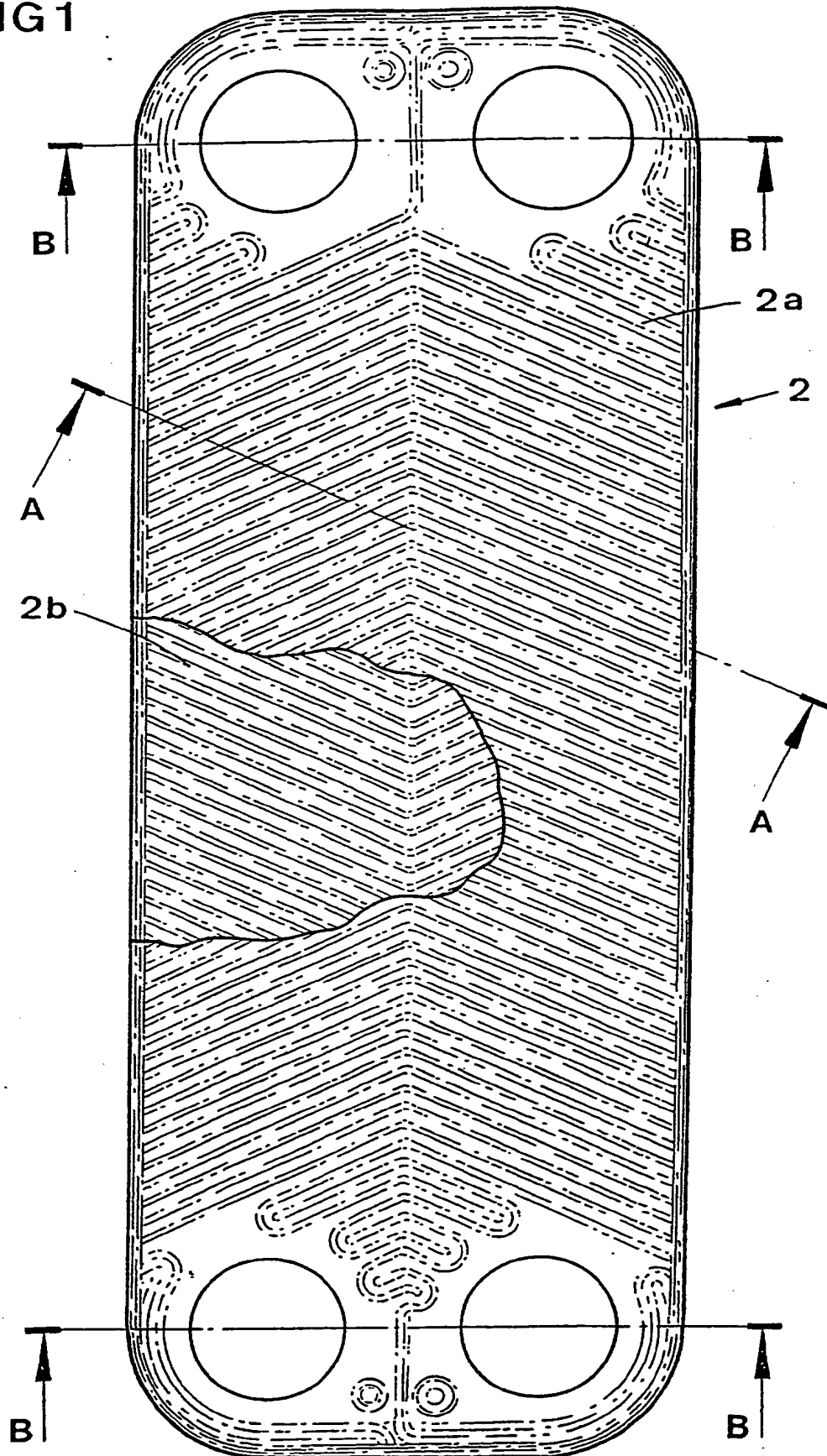


FIG 2

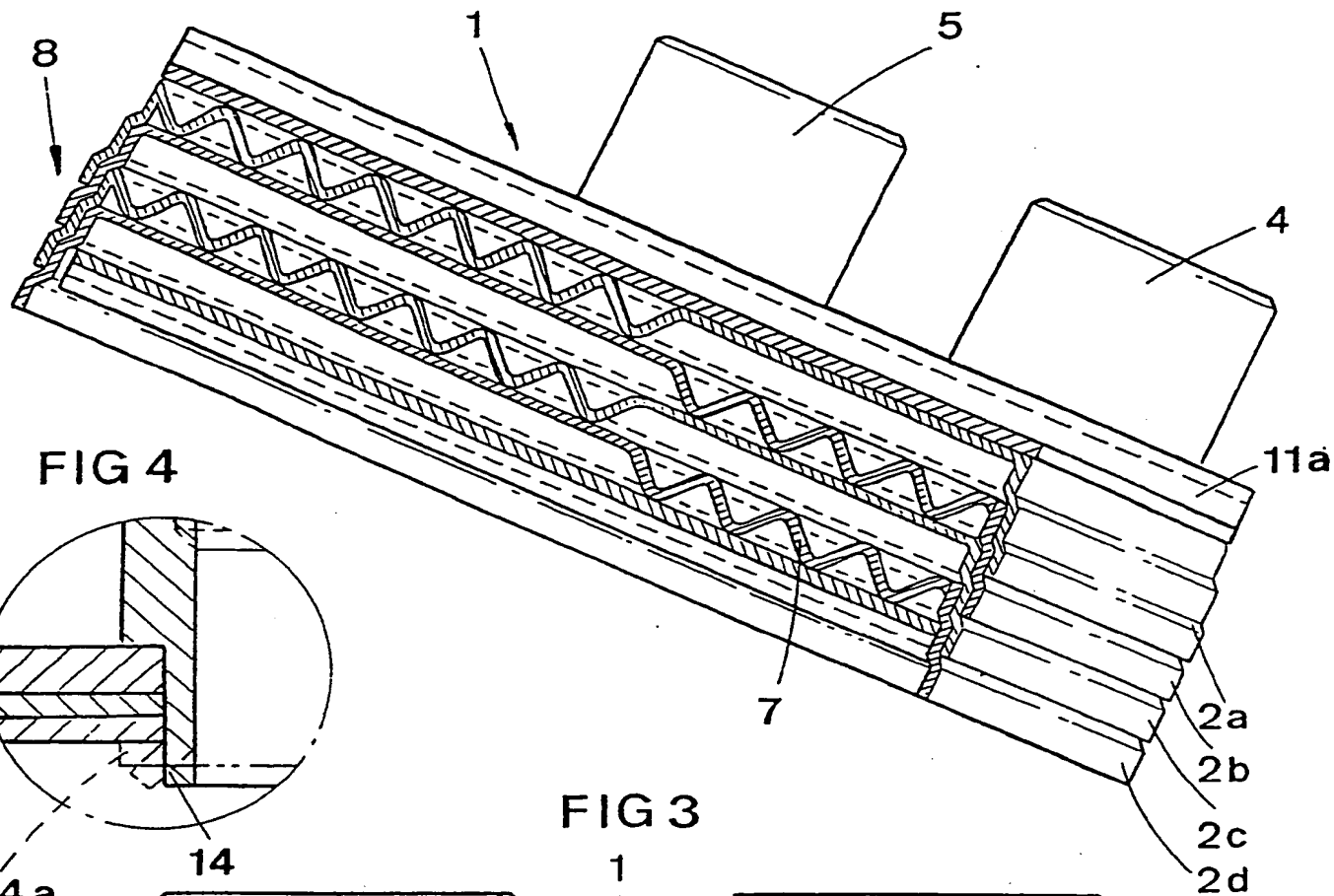


FIG 4

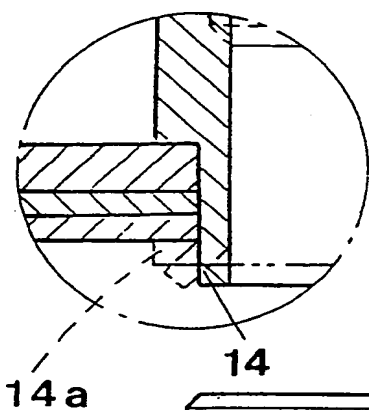
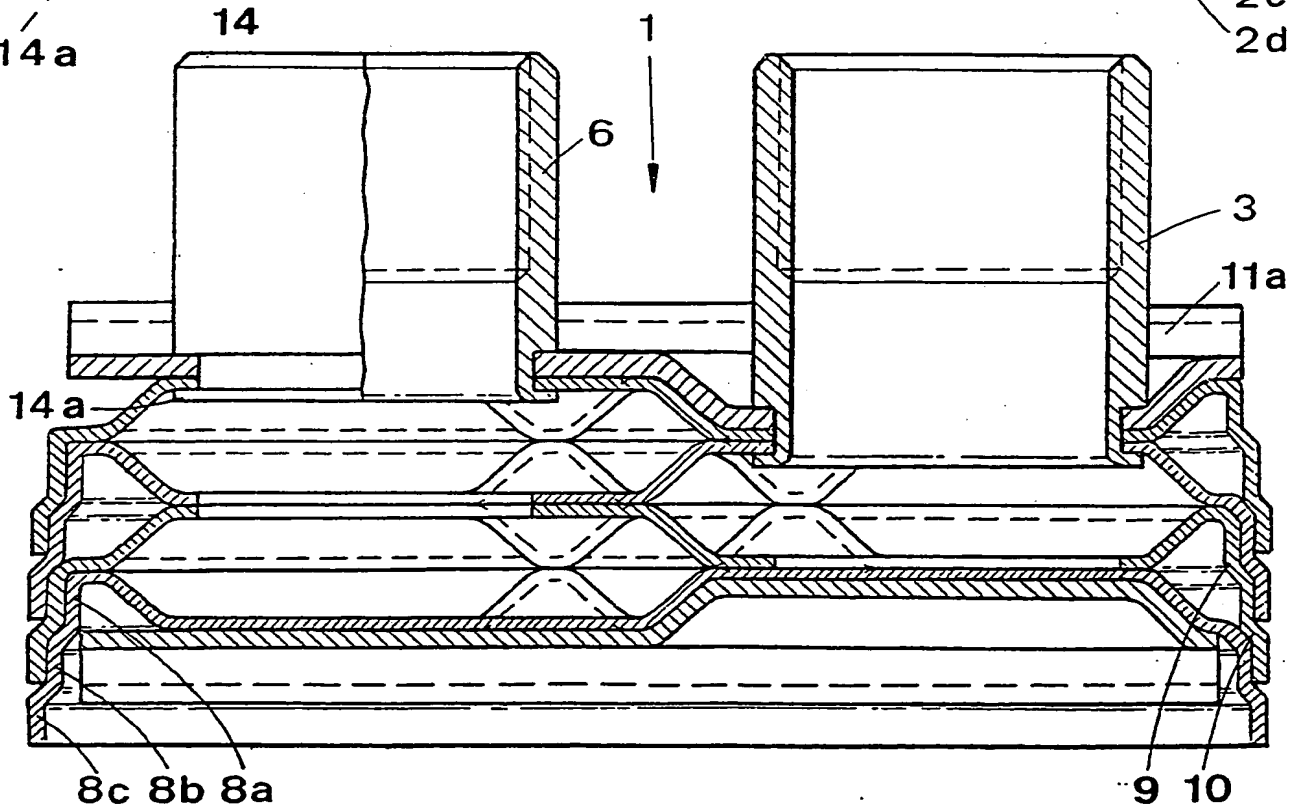


FIG 3



INTERNATIONAL SEARCH REPORT

International Application No

PCT/SE86/00141

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC ⁴ F 28 D 9/00														
II. FIELDS SEARCHED <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Minimum Documentation Searched ⁷</div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 30%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">IPC</td> <td style="padding: 5px;">F 28 F 3/00-/08; F 28 D 9/00-/04; B 23 P 15/26</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">Nat C1</td> <td style="padding: 5px;">53e:2; 17f:5/30-31</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;">US C1</td> <td style="padding: 5px;">165:165-167</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black;">Documentation Searched other than Minimum Documentation to the extent that such Documents are included in the Fields Searched ⁸</div> <p style="text-align: center; padding: 10px 0;">SE, NO, DK, FI classes as above</p>			Classification System	Classification Symbols	IPC	F 28 F 3/00-/08; F 28 D 9/00-/04; B 23 P 15/26	Nat C1	53e:2; 17f:5/30-31	US C1	165:165-167				
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III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹ <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category ⁹</th> <th style="width: 70%; border-bottom: 1px solid black;">Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²</th> <th style="width: 20%; border-bottom: 1px solid black;">Relevant to Claim No. ¹³</th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">GB, A, 1 468 410 (KUREHA KAGAKU KABUSHIKI KAISHA) 23 March 1977 & DE, 2421414 JP, 50000448</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">DE, A, 3 033 452 (WÜLFING UND HAUCK GMBH & CO KG) 29 April 1982</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">X</td> <td style="padding: 5px;">CH, A, 633 099 (ALFA-LAVAL AB) 15 November 1982 & BE, 870977 GB, 2005398 NL, 7809803 FR, 2405454 DE, 2840522 JP, 54067258 SE, 7810049</td> <td style="text-align: center; vertical-align: top; padding: 5px;">1</td> </tr> </table>			Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	GB, A, 1 468 410 (KUREHA KAGAKU KABUSHIKI KAISHA) 23 March 1977 & DE, 2421414 JP, 50000448	1	X	DE, A, 3 033 452 (WÜLFING UND HAUCK GMBH & CO KG) 29 April 1982	1	X	CH, A, 633 099 (ALFA-LAVAL AB) 15 November 1982 & BE, 870977 GB, 2005398 NL, 7809803 FR, 2405454 DE, 2840522 JP, 54067258 SE, 7810049	1
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>¹⁰ Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"A" document member of the same patent family</p> </div> </div>														
IV. CERTIFICATION <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of the Actual Completion of the International Search 1986-06-27 </td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> Date of Mailing of this International Search Report 1986-07-03 </td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;"> International Searching Authority Swedish Patent Office </td> <td style="border-bottom: 1px solid black; padding: 5px;"> Signature of Authorized Officer </td> </tr> </table>			Date of the Actual Completion of the International Search 1986-06-27	Date of Mailing of this International Search Report 1986-07-03	International Searching Authority Swedish Patent Office	Signature of Authorized Officer 								
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